

TWO-YEAR OLD IMMUNIZATION COVERAGE SURVEY OF SOUTH CAROLINA CHILDREN 2000

The South Carolina Department of Health and Environmental Control's (DHEC) Immunization Division conducted an immunization coverage survey in order to estimate vaccination coverage levels among two-year old South Carolina children. The survey began in September, 2000, was completed in January 2001, and used a prospective, birth registry-based design.

Sampling Frame

The sampling frame consisted of 12,950 live births occurring to South Carolina residents in South Carolina, Georgia, and North Carolina during the months of January, February, and March 1998. The sampling frame excluded known deaths and adoptions.

Sample

Using one simple random sample, 600 children were selected for the survey. The names and mailing addresses for each child selected for the survey were compared with the state health department's master file of children immunized in public clinics in order to update mailing addresses where matches were found between the two files. The frame and sample were provided by DHEC's Division of Biostatistics, Office of Vital Records and Public Health Statistics.

Data Collection

Names and birth dates of all children in the sample were compared against the DHEC PATS Immunization Registry. Three hundred and thirty-five (55.8%) children were found in the system. Of these 49 (8.2%) were 431331 (4 DTaP, 3 polio, 1 MMR, 3 Hib, 3 HepB, 1 varicella) series complete. The names and addresses of children who were not identified in the PATS Immunization Registry or who were not found to be 431331 series complete were forwarded to district staff for collection of immunization data.

Dates of each vaccine the child had received, the immunization provider or providers of those immunizations, birth date, sex, race, and county of residence were collected by field staff on the data collection forms. Disposition codes were also collected as a means of studying the amount of effort required to collect these data. Procedures for data collection included searching health department immunization records, physician office immunization records, immunization records on military bases, community and rural health centers, and homeless shelters, and, where immunization data remained questionable, home visits were made in an attempt to locate non-responders.

Data collection forms were batch processed for keying by an independent company and a data file was created for analysis. Coding was supervised by the Immunization Division.

Preliminary data editing included the following: a review of data collection forms for all children who were not 4313 (4 DTP, 3 Polio, 1 MMR, 3 Hib) series complete, correction of keying errors, resubmission of selected forms to DIS as possible recording errors, and correction of recording errors. Sixty-four (10.7%) forms were suspected of having data errors, 56 (9.3%) were found to have recording or keying errors, 46 (7.7%) children were found to be series complete after correction of errors.

The sample was also matched by name and date of birth to the Medicaid recipient file to identify children who were Medicaid eligible. Any child with a Medicaid number recorded in the PATS system or identified in the Medicaid recipient file was considered Medicaid eligible. The Medicaid match was performed by the Office of Research and Statistics.

Data Analysis

Data analysis consisted of descriptive statistics about the sample and the vaccination coverage level using multiple vaccine coverage criteria. These criteria included individual (antigen) specific analysis and combined series analysis. Additional data analysis rules applied in this survey were: (1) a minimum of a 28 day interval between doses of vaccine and, (2) MMR and Varicella must have been on or after the child's first birthday, and (3) no immunizations a child received on or after his/her second birthday were counted. The data were also analyzed by WIC and Medicaid participation. Statistical Analysis Systems (SAS) was used to perform all analyses of the survey data. Data analysis was conducted by DHEC's Immunization Division.

Results

Of the 600 children selected for the survey, 535 responses were collected, yielding a response rate of eighty-nine percent. Forty-six of the 600 children (7.7%) were found to have moved out of state. Fourteen of the 600 children (2.3%) could not be located during the survey period. Three of the 600 children refused to participate.

One hundred and thirteen (21%) of the children received all immunizations in Health Department clinics only, 326 (61%) received all immunizations from sources other than DHEC, and 96 (18%) received immunizations from a combination of DHEC and other providers. Two hundred and eighty-nine (54%) of the children were Medicaid eligible and 280 (52.3%) participated in WIC.

Vaccination coverage survey results from identical methodologies employed in 1999 and 2000 are shown in table 1.

Table 1. Vaccination coverage levels among 2-year-olds* with vaccines routinely recommended for children, by vaccination and period - South Carolina, 1999 and 2000

<u>Vaccination</u>	1999		2000	
	%	(95%CI§)	%	(95%CI§)
<u>Individual</u>				
<u>DTP/DT/DTaP¶</u>				
≥3 doses	98.5%	(97.5%-99.5%)	98.1%	(97.0%-99.3%)
≥4 doses	89.9%	(87.4%-92.5%)	88.4%	(85.7%-91.1%)
<u>Polio</u>				
≥3 doses	96.3%	(94.7%-97.9%)	95.3%	(93.5%-97.1%)
<u>Hib**</u>				
≥3 doses	92.7%	(90.5%-94.9%)	97.2%	(95.8%-98.6%)
<u>MMR</u>	95.5%	(93.8%-97.3%)	96.1%	(94.4%-97.7%)
<u>Hepatitis B</u>				
≥3 doses	97.0%	(95.6%-98.5%)	95.0%	(93.1%-96.8%)
<u>Varicella</u>	58.3%	(54.2%-62.5%)	81.5%	(78.2%-84.8%)
<u>Combined Series</u>				
4DTP/3Polio/ 1MMR	89.1%	(86.5%-91.8%)	88.0%	(85.3%-90.8%)
3DTP/3Polio/ 1MMR /3Hib	93.8%	(91.8%-95.9%)	92.9%	(90.7%-95.1%)
4DTP/3Polio/ 1MMR /3Hib	89.0%	(86.3%-91.6%)	87.7%	(84.9%-90.5%)
4DTP/3Polio/ 1MMR /3Hib /3HB†	87.5%	(84.7%-90.3%)	84.5%	(81.4%-87.6%)
4DTP/3Polio/ 1MMR /3Hib /3HB/1Var‡	54.0%	(49.8%-58.3%)	72.2%	(68.4%-76.0%)

* Persons aged 730 days.

§ Confidence Interval.

¶ Diphtheria and tetanus toxoids and pertussis vaccine or diphtheria and tetanus toxoids vaccine.

** *Haemophilus influenza* type b conjugate vaccine.

† Hepatitis B vaccine

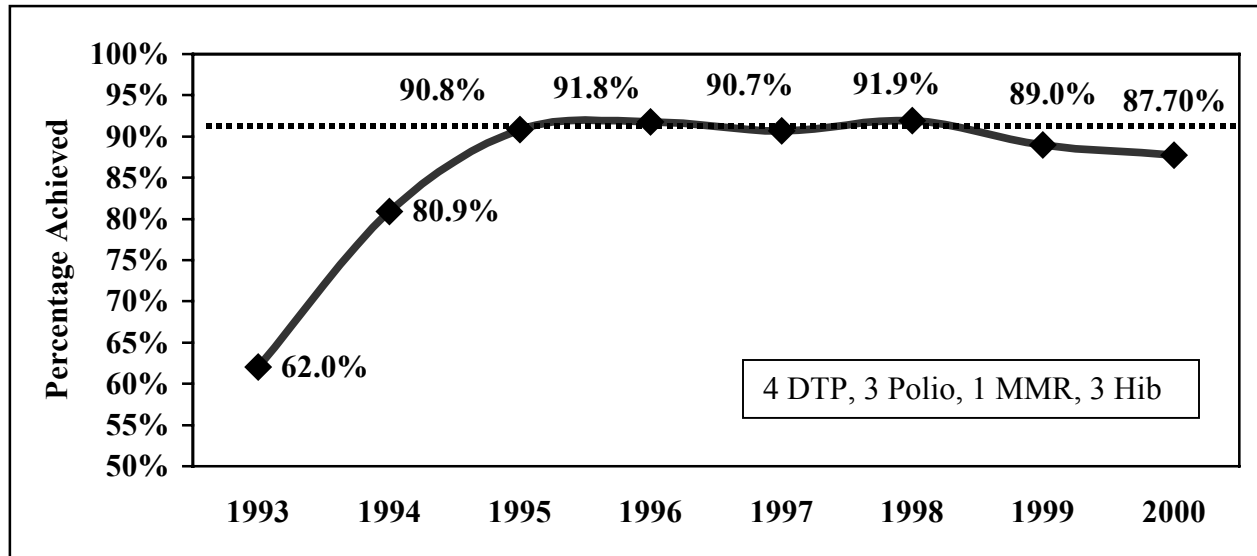
‡ Varicella vaccine

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Discussion

A graph of immunization coverage rates in South Carolina since 1993 is shown in Table 2. The change in vaccination coverage from 89 percent in 1999 to 87.7 percent in 2000 is not statistically significant¹ and therefore, reaffirms that South Carolina's immunization activities continue to result in high levels of protection for the state's preschool aged population.

TABLE 2: South Carolina Immunization Coverage Rates 1993-2000



Immunization services for preschool children continue to be offered in both public health departments and private physicians' practices throughout the state (Table 3). The vaccination coverage level for children served by DHEC clinics only declined from 94.6 percent in 1999 to 88.5 percent in 2000, and for children served by Non-DHEC only practices, the vaccination coverage level increased from 87.7 percent in 1999 to 91.4 percent (Table 4). Rates compared by provider type and district are also provided (Table 5). Non-DHEC practices continue to vaccinate increasing numbers of preschool children in the state while DHEC serves fewer and fewer children.

¹ Two methods were employed in determining if the current value of 87.7% is significantly different from coverage rates found in previous years. A comparison of multiple proportions (Fliess, 1981) failed to show that the coverage rates for 1995-2000 were significantly different from each other. A comparison of 95% confidence intervals showed overlapping intervals for the years 1995-2000. A third test was also employed to determine if the 87.7% coverage rate was significantly different from 90% (Daniel, 1983). The test failed to show any significant difference.

TABLE 3: Percentage of Children Immunized by Health Department only, Health Department and Other Providers, and other than Health Department 1997-2000

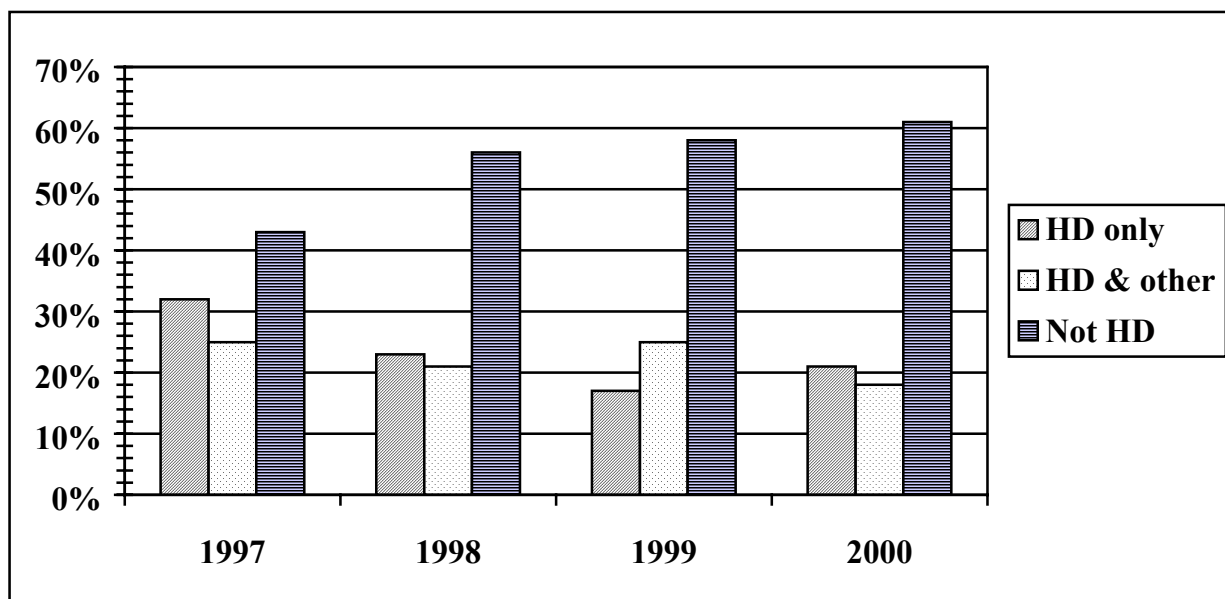


TABLE 4: South Carolina Immunization Coverage Rates by Provider Type 1998-2000

	1998	1999	2000
Health Department Only	91.5%	94.6%	88.5%
Health Department and Other Providers	92.5%	88.1%	74.0%
Not Health Department	91.8%	87.7%	91.4%

TABLE 5: South Carolina Immunization Coverage Rates by District and Provider Type
NOTE: Percentages are based on very small numbers, interpret with caution.

District	Health Department Only	Health Department and Other Providers	Not Health Department
Appalachia I	100%	100%	96%
Appalachia II	88%	78%	95%
Appalachia III	100%	56%	94%
Catawba	100%	86%	93%
Edisto	83%	75%	80%
Low Country	75%	86%	100%
Lower Savannah	67%	60%	82%
Palmetto	88%	70%	89%
Pee Dee	93%	82%	97%
Trident	71%	82%	90%
Upper Savannah	80%	80%	80%
Waccamaw	100%	63%	83%
Wateree	100%	-	100%

Of the 289 Medicaid eligible children, 84.8% were 4314 (4 DTP, 3 Polio, 1 MMR, 3 Hib) series complete, while 91.1% of the 246 children who were not Medicaid eligible were 4313 series complete. Eighty-eight percent of the 280 WIC participants were series complete, while 87.6% of the 255 children who did not participate in WIC were series complete. (Table 6)

TABLE 6: South Carolina Immunization Coverage Rates
by WIC and Medicaid participation.

	N	number 4313 series complete	percent 4313 series complete
WIC			
Participants	280	247	88.2%
non participants	255	222	87.6%
Medicaid			
participants	289	245	84.8%
non participants	246	224	91.1%

Three hundred and twenty-six (61%) of the children in the final sample were of white race, while 203 (38%) were of black race. The remaining 1% of the sample were children of Chinese, Filipino, Indian, or Other Asian race. Analysis of coverage rates by race ('white' and 'black and other') showed a statistically significant difference in coverage rates for 2000. Table 7 describes coverage rates by race since 1994.

TABLE 7: South Carolina Immunization Coverage Rates by Race 1993-2000

year	White	Black and Other	Total	p-value (χ^2)
2000	90.2%	83.7%	87.7%	0.027
1999	88.3%	89.4%	89.0%	0.670
1998	92.2%	91.4%	91.9%	0.758
1997	90.9%	90.4%	90.7%	0.837
1996	93.4%	89.6%	91.8%	0.109
1995	90.7%	91.1%	90.8%	0.874
1994	84.4%	76.4%	80.9%	0.022

TABLE 8: South Carolina Immunization Coverage Rates by Race and Provider Type 2000

	Health Department Only	Health Department and Others	Not Health Department
White	90.3%	80.5%	91.9%
Black and other	86.3%	69.1%	90.3%
p-value (χ^2)	0.502	0.208	0.624

Race	Health Department Only	Health Department and Others	Not Health Department	p-value (χ^2)
White	90.3%	80.5%	91.9%	0.077
Black and other	86.3%	69.1%	90.3%	0.002

Race	Health Department Only	Not Health Department	p-value (χ^2)
White	90.3%	91.9%	0.687
Black and other	86.3%	90.3%	0.454

For the first time since 1994, the coverage level among African-American, Asian, Hispanic, and Native American children was significantly lower than the coverage level for Caucasian children. Upon further analysis, this difference can be observed among children who are served by more than one medical home.

Single antigen data for the 15 to 18 month (fourth) dose of DTP continue to demonstrate the difficulty providers have with vaccinating children before 24 months of age. Twenty-seven children (5%) were not series complete because they were missing the fourth dose of DTP

vaccine. Thirty-four children (6.4%) were not series complete because they received the fourth dose of DTP after they had reached their second birthday.

Varicella immunization was recommended in 1996. The number of two-year old children who have received the recommended one dose of varicella vaccine has increased from 58.3% percent in 1999 to 81.5 percent in 2000. Single antigen vaccination coverage levels among the state's preschool child population for all other vaccines except for the fourth dose of DTP remain above 90 percent.